Kids and Educators Agree,

The Cat in the Hat Knows a Lot About That!™ can teach science...

...to a great degree!

Executive Summary of Mixed Methods Study of the Effects of The Cat in the Hat Knows a Lot About That!™ on Pre-School Children’s Perceptions of Science and Knowledge of the Nature of Science and Engineering

April 2020
Research done by URI shows that multi-platform content from the PBS KIDS series The Cat in the Hat Knows a Lot About That!™ boosts preschoolers’ understanding of science and engineering.

Our University of Rhode Island research team, as part of an initiative with PBS KIDS and the Corporation for Public Broadcasting, studied the impact of the learning media on 137 preschool children in 13 classrooms from Rhode Island public school districts.

Each child received two tablets containing downloaded episodes from The Cat in the Hat Knows a Lot About That!™, and The Cat in the Hat Builds That!™ mobile app to use at home and at school for up to eight weeks. URI researchers visited the classrooms on five occasions to assess the children’s understanding of the nature of science and engineering and their perceptions of science. Parents and teachers also reported their observations on a weekly media log.

During the course of the study, the URI researchers used three critical tools, two of which they developed: the Nature of Science and Engineering Survey (NOSES); and the Digital Design A Scientist Test (D-DAST); as well as the Draw A Scientist Test (DAST), which they administered to the children throughout the eight-week period.

In addition, the children, their parents and teachers had access to The Cat in the Hat Knows a Lot About That!™ multi-platform media:

- 30, 11-minute episodic video stories;
- 11, 90-second interstitials;
- 1 mobile app with 5 games and open-ended exploration area;
- 4 teacher lesson plan packets;
- and 5 family real-world activity printables.

Research Question
How does exposure to The Cat in the Hat Knows a Lot About That!™ content funded by the Ready To Learn grant affect children’s understanding of the nature of science and engineering?
Children who had the intervention for at least 4 weeks made gains in their understanding of the nature of science and engineering.

Parents reported that children developed new language, applied their learning to real world experiences, and engaged in the practices of science and engineering overtime.
Research Question: How do children’s socio-economic status, and qualification for special education impact their understanding of the nature of science and engineering over time?

Although children receiving special services scored lower than their typically developing peers, they had similar increases in their understanding of the nature of science over the course of the research.

Students who received special education services increased their understanding of the nature of science at the same rate as their peers.
Socio-economic Differences

Children from lower income groups had greater gains in scores over time.

<table>
<thead>
<tr>
<th>Income Level</th>
<th>Percent change in scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $24,999</td>
<td>12.3%</td>
</tr>
<tr>
<td>$25,000-$49,999</td>
<td>8.6%</td>
</tr>
<tr>
<td>$50,000-$74,999</td>
<td>7.2%</td>
</tr>
<tr>
<td>$75,000+</td>
<td>5.3%</td>
</tr>
</tbody>
</table>

Gender

Girls tended to draw females as scientists after engaging in *Cat in the Hat Knows A Lot About That!*™ Multi-Media Study.

![Graph showing socio-economic differences and gender differences in drawings of scientists over time.](image)
The research team conducted analysis using data from the Digital Draw A Scientist Test (D-DAST) and the Draw A Scientist Test (DAST) to examine how the intervention affected children’s perceptions of science. These tests group representations of scientists into three categories and define them as “traditional” (older white males wearing lab coats), “sensationalized” (monsters, superheroes, and magicians), and “contemporary” (diverse people doing science and engineering practices). Experiences with the mult-platform media provided opportunities for children to decrease their sensationalized and traditional views of scientists and to develop a more accurate and contemporary perception that scientists are real, diverse people, who work in many settings, and study the world in many ways.

**Activity**

Preschoolers’ Perceptions of What a Scientist Does

<table>
<thead>
<tr>
<th>Location</th>
<th>Sensationalized</th>
<th>Traditional</th>
<th>Contemporary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>38.24%</td>
<td>20.59%</td>
<td>23.81%</td>
</tr>
<tr>
<td>Post</td>
<td>23.53%</td>
<td>23.58%</td>
<td>15.79%</td>
</tr>
<tr>
<td></td>
<td>55.88%</td>
<td></td>
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</tbody>
</table>

**Location**

Preschoolers’ Perceptions of Where a Scientist Works

<table>
<thead>
<tr>
<th>Location</th>
<th>Sensationalized</th>
<th>Traditional</th>
<th>Contemporary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>23.81%</td>
<td>30.95%</td>
<td>44.22%</td>
</tr>
<tr>
<td>Post</td>
<td>7.02%</td>
<td>15.79%</td>
<td>77.19%</td>
</tr>
</tbody>
</table>
Summing it up:

“The study’s results are really encouraging,” said Sara Sweetman, URI assistant professor of education and lead researcher on the study. “If free and publicly available media can support the knowledge and skills needed to start school, we can begin to decrease the achievement gap prevalent in kindergarten.

“Media often portrays unrealistic views of science and engineering and who is included in the work,” Sweetman said. “Media like The Cat in the Hat Knows a Lot About That!™, which is intentionally designed to be inclusive of everyday people and places, and shows authentic science and engineering practices, has the potential to start all kids on a path toward building a more diverse and innovative future.”

As one parent reported on the post-survey, “My daughter told my husband and me that she may become a scientist or engineer. I know she has learned those career options from participating in all the different Cat in the Hat Knows a Lot About That!™ activities. She also set up her own sink and float experiment at the house where her older siblings had to make predictions and then participate in the investigation.”
The URI research team

Sara Sweetman, a URI assistant professor of education, is an adviser to a joint early learning initiative of the Corporation for Public Broadcasting and Public Broadcasting Service, funded by the U.S. Department of Education to create educational media for PBS KIDS. As part of the Ready To Learn Initiative, Sweetman was awarded a grant to better understand how multimedia experiences at home and school can prepare children for school success and support their pathways toward science and engineering careers.

From left are: Susan Brand, professor of education; Kayon Murray-Johnson, assistant professor of education; Sweetman, research team leader; Beth Holland, a postdoctoral fellow; Hyunjin Kim, associate professor of human development and family studies; and Kelly Shea, an education specialist with URI’s Guiding Education in Math and Science Network.

PBS KIDS’ series The Cat in the Hat Knows a Lot About That!™ supports learning by modeling science practices and language and exploring science and engineering content through animated stories. Study resources included videos, digital games, and hands-on activities from the third season embedded in a game app, and printed activities available from PBS KIDS. The Cat in the Hat Knows a Lot About That!™ is a PORTFOLIO ENTERTAINMENT INC. production and is derived from properties held by Penguin Random House and Dr. Seuss Enterprises.

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The Ready To Learn Initiative is a cooperative agreement funded and managed by the U.S. Department of Education’s Office of Elementary and Secondary Education (OESE). It supports the development of innovative educational television and digital media targeted to preschool and early elementary school children and their families. Its general goal is to promote early learning and school readiness, with a particular interest in reaching low-income children. In addition to creating television and other media products, the program supports activities intended to promote national distribution of the programming, effective educational uses of the programming, community-based outreach, and research on educational effectiveness.

The contents of season 3 of The Cat in the Hat Knows A Lot About That!™ And The Cat in the Hat Builds That!™ app were developed under a grant from the Department of Education. However, those contents do not necessarily represent the policy of the Department of Education, and you should not assume endorsement by the federal government. The project is funded by a Ready To Learn grant (PR/award No. U295A150003, CFDA No. 84.295A) provided by the Department of Education to the Corporation for Public Broadcasting.

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